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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/967,183	09/28/2001	Hannu Paananen	14765	5969

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Garden City, NY 11530

EXAMINER

MCINTOSH III, TRAVISS C

ART UNIT	PAPER NUMBER
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1623

DATE MAILED: 10/16/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

File Copy

**Office Action Summary**

Application No.

09/967,183

Applicant(s)

PAANANEN ET AL.

Examiner

Traviss C McIntosh

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

The Amendment filed August 21, 2003 has been received, entered into the record, and carefully considered. The following information provided in the amendment affects the instant application by:

Claims 11, 14, 20-23, 31, and 36-39 have been amended.

Claims 44 and 45 have been added.

Remarks drawn to rejections of Office Action mailed May 20, 2003 include:

112 2<sup>nd</sup> paragraph rejections: which have been overcome by applicant's amendments and arguments and have been withdrawn.

103(a) rejection: which has been maintained for reasons of record.

An action on the merits of claims 1-45 is contained herein below. The text of those sections of Title 35, US Code which are not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 103***

The rejection of claims 1-45 under 35 U.S.C. 103(a) as being unpatentable over Heikkilä et al. (4,359,430) of record in view of Qui et al. (CN 1234404A) is maintained for reasons of record.

The claims of the instant application are drawn to a method of separating sugars and non-sugars from a solution comprising passing the solution through at least one weak acid cation exchange column and at least one strong acid cation exchange column wherein the resin is in the form of a salt and is crosslinked with divinyl benzene (DVB) wherein the crosslinking degree of

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the resin is 3%-8% by weight and the particle size of the resin is  $10\mu\text{m}$  to  $2000\mu\text{m}$ . Products to be isolated are betaine, inositol, mannitol, sucrose, erythritol, glycerol, and/or amino acids and the solution to be treated in the chromatographic column is a sugar beet solution (vinasse, molasses, or betaine molasses). The eluant used in the column is water in a temperature of between  $10^{\circ}\text{C}$ - $95^{\circ}\text{C}$ . Additionally, there is optionally a concentration or filtration unit arranged between the columns, wherein the solution is concentrated by evaporation. The chromatographic separation can be a simulated moving bed process (either continuous or sequential) or a batch process and the feed solution has a pH of from 6-11.

Heikkilä et al. teaches of a process of separating betaine from the sugars and nonsugars of beet molasses by a chromatographic process (column 2, lines 7-10). The column contains a strong cation exchange in alkali form wherein sodium is generally the preferred alkali form and the elution material is generally water at  $60^{\circ}\text{C}$ - $90^{\circ}\text{C}$  (column 2, lines 39-46). The resin is preferably a sulphonated polystyrene exchange resin crosslinked with from about 2 to about 12 percent and preferably 3-9 percent weight divinylbenzene (DVB) wherein they have a uniform particle size of about 0.2mm-0.5mm ( $200\mu\text{m}$  - $500\mu\text{m}$ ). The feed is preferably a betaine-containing beet molasses, a rest molasses, or vinasse (column 2 lines 47-60). The elution material is recovered as a first nonsugar waste fraction, a second sugar-containing fraction, and a third containing betaine. The nonsugar and sugar fractions are then subjected to further treatments to recover the remaining materials (column 2, lines 62-69). Betaine is then recovered by evaporation and crystallization (column 3, lines 39-47). Heikkilä et al. also teach that multiple chromatographic steps may be preformed to obtain the desired compounds (column 4, lines 17-29).

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What is not taught by Heikkilä et al. is to use a weak acid ion exchange column additionally in the process.

Qui et al. teach a method of separating sugars, D-ribose, from a fermentation liquor comprising the multi-step chromatography process wherein a pre-treated fermented liquor is passed through a strong-acid cation exchange resin, a weak-base anion exchange resin, and a weak-acid cation exchange resin.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a multi-column chromatography process with at least one weak-acid cation exchange resin to separate sugars and non-sugars from a solution as divergent products are known in the art to be obtained at various pHs in chromatography columns because of their different properties and reactivity kinetics. One of ordinary skill in the art would recognize that the various products would be eluted at various rates in a chromatographic column based on both the properties of the column and compound eluted. It would be obvious to one of ordinary skill in the art at the time the invention was made to add an additional chromatographic column which has different properties than the first column to purify a solution which has multiple compounds that would react differently to different columns and be eluted at different rates among the various columns. One would be motivated to have a multi column system and or a column with various zones which have different properties, such as ionic strength, to separate various compounds which are in the same solution as the products would be eluted at rates dependent upon the column/compound properties. One would be motivated to add the weak-acid cation exchange resin column of Qui et al. as Qui et al. teach that this column, especially when used in

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conjunction with other columns such as a strong-acid cation exchange column, is effective in removing sugars from a solution which has multiple compounds.

Applicant's arguments filed August 21, 2003 have been fully considered but they are not persuasive. Applicant's argue that the combination of Qui et al. and Heikkilä et al. do not render obvious the instant applications claims because the instant application is drawn to chromatographic separation, while Qui et al. is directed to separating sugars using three different kinds of ion exchange resins. The thrust of applicant's arguments is drawn to the chromatographic separation of the instant application is different than the separation using ion exchange resins. The examiner respectfully disagrees with this statement. Chromatographic separation is a process in which a chemical mixture carried by a liquid or gas is separated into components as a result of differential distribution of the solutes as they flow around or over a stationary liquid or solid phase. The various ion exchange resins used by Qui et al. in their method of chromatographic separation is indeed correlative to the ion exchange resins of the instant application. Qui et al. teach to use a strong-acid cation exchange resin, a weak-base anion exchange resin, and a weak-acid cation exchange resin in a multi-column system for separating sugars from a solution. These different resins are used in a methodological process for separating D-ribose from a fermentation liquor. The method employed by Qui et al. requires passing the liquor through the various columns of differing ion exchange resins in which the various products are eluted at various rates based on the reactivity kinetics of the resin and the solution passing over it, which is chromatographic separation.

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

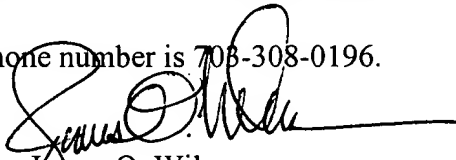
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Traviss C McIntosh whose telephone number is 703-308-9479. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James O. Wilson can be reached on 703-308-4624. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0196.

Traviss C. McIntosh III  
October 9, 2003

  
James O. Wilson  
Supervisory Patent Examiner  
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